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INSTRUCTIONS  
IN THE  
ART OF LITHOGRAPHY

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C. STRAKER

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BY C. STRAKER.

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## INTRODUCTION.

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To supply a long-felt deficiency, we have been induced to publish the results of many years' practical experience in Lithography, with a confident hope that our hints may prove useful not only to Amateurs for reproducing and multiplying sketches either in outline or color—to the Merchant and Manufacturer, both at home and abroad, as an accessory to their businesses, enabling them to produce private communications, telegrams, prices current, &c., in their counting-houses—but to the Printing Trade who wish to add this important branch to their existing plants.

It has, hitherto, been the general plan of all writers on the subject to envelope in mystery the principal proceedings of the practical lithographer—entering into the scientific theory instead of giving that plain information, which alone can be of real assistance to the amateur; in supplying, therefore, that information which has been continuously sought at our hands to promote the introduction of the art, not in the provinces alone, but also in the colonies, we are convinced that the general rule of giving too numerous methods of proceeding serves only to bewilder rather than instruct. We have, therefore, devoted the following pages

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## INTRODUCTION.

to the purpose of explaining the most ready means of pursuing this most interesting and useful art, being assured that, by strict adherence to the principles set forth, the most satisfactory results can be obtained. The progress of the art having rendered the manufacture of the materials employed a separate and special business, the lithographer of the present day is, therefore, not only released from the difficulties which have hitherto surrounded him in their production, but he is enabled also to purchase his requirements at a considerably less cost than he could produce them.

It may appear to those who are imperfectly acquainted with the art, that because the operations are of such *apparent* simplicity, less care in their execution is needed; but this is a mistaken idea. Lithography depends less upon mechanical than chemical principles; the process, therefore, demands extreme nicety and care; and, it must be observed, that the success of the operator mainly depends upon his attention to *little things*. Embarrassments and difficulties, which may frequently occur to the beginner, can generally be traced to neglect of small details, which he may not have deemed worthy his attention; let those, therefore, who would succeed, bear these remarks in mind, and they need scarcely fear failure.

C. S.



# LITHOGRAPHY.

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## THE EARLY HISTORY OF LITHOGRAPHY.

FOR the invention of lithography we are indebted to Aloys Senefelder, a native of Prague, although a resident of Munich at the time of its discovery, in 1798.

The youth of this gifted man was a constant scene of privation and distress. With a taste for dramatic performance, and yet not sufficient talent to render him the fame he sought, disappointment drove him to try another branch of the theatrical art, viz.—composition. Of his productions in this line we know nothing, but that he obtained, through them, access to a printer's office; and, by aid of quick observation, an ingenious disposition, and steady perseverance, gained sufficient knowledge to pursue the art with some success.

Want of means was the great obstacle which opposed Senefelder's progress, and yet to this deficiency lithography owes its birth. His first thoughts were how to obtain ready and cheap printing materials for his use, and for this the stones of Kellheim appeared to him very good

substitutes for metal plates, which he used for reverse writing, &c. His plan was to cover the stone with a varnish, of which wax, soap, and turpentine were the principal ingredients, and to scrape his design or writing on this composition with a metal point, which plan we learn, did not answer well; and it was not until the July of 1796, that accident brought to light the real value of these substitutes.

Having to write out a laundress' bill, and finding no paper for the purpose, Senefelder used in haste, the corner of one of his polished stones, on which he wrote with his varnish the required bill, and before rubbing it off he was determined to see what would become of his writing when subjected to the action of acids, and the aid of the dabber charged with printing ink. The results proved to him that he had discovered lithography, and from that time he abandoned his mechanical mode of printing for one on purely chemical principles.

With untiring perseverance he followed out his first attempt, and made many trials during the space of two years, when he became acquainted with M. Gleissner, a composer of music, who gave him that assistance which raised the new art from a state of trial to one of application. The inventor and his associate printed music, with presses roughly constructed, but from which were issued, as the first lithographic productions, twelve airs, with accompaniments, for the piano, and two duets for the flute.

In 1801 Senefelder was brought to London by M. Philippe Andre, but after a stay of seven months, he returned home disappointed of success; and during the following twelve years, he laboured with increasing diligence towards the perfection of the art.

In 1815 Count Lasteyrie opened a lithographic establishment at Paris, and G. Englemann also established one at Mulhausen. At the former place, during the following year, three more were added, viz., those of Constans, Vellain, and Englemann, and lithography began now to make rapid progress. Amongst the names of those who assisted to perfect it, we may mention M. Knecht, Aretin, Waulich, Mitterer, &c.

Better favoured than many other men of genius, Senefelder lived to enjoy the benefits and honour of his invention. The King of Bavaria, a patron of the arts, granted him a pension, which rendered his latter years free from all pecuniary anxiety; added to which, the sovereigns of Austria, Saxony, Russia, and England, honoured Senefelder by presenting him with rings and medals, to show their appreciation of his genius.

Senefelder died February 26th, 1834, after a short illness, hastened, it is supposed, by grief at having lost his sight, which he was deprived of six weeks before his decease. A monument was erected to his memory, by order of his royal patron, built with the stone of Kellheim.

Some time after interment the remains of Senefelder were exhumed and placed in the Pantheon of modern Athens. A large statue of the inventor of lithography has been erected, and a street of the capital of Bavaria has received his name.

At the exhumation of his body, strange to relate, there was found in his brain two stones, each of the size of a nut, and covered with a smooth white skin. These stones, which in Germany are called "Fenensteine," have been deposited with the Polytechnic Society of that country. It is a complaint rarely, but still occasionally heard of, and may explain the frequent headache with which Senefelder was afflicted.

Since the death of Senefelder lithography has progressed with tenfold rapidity. France, Austria, and Germany, have supplied many bright examples of talent and industry, in men who have striven, and are striving, to render it still more widely known and appreciated. Nor can we say that England has been deficient, as many of her productions testify. As a practical and working country she has also done her part, for what the higher imaginations of continental artists have contemplated she has carried out; and if it has not been employed by us for purposes of embellishment so much as in France and Germany, we have turned it to much account, and it has grown, from a little branch, to be almost as great an art as letter-press printing, both as regards the multiplicity of application,

and facility with which its advantages can be made use of; opening, as it has, so many branches, and so wide a field for further extension. To the artist it is invaluable: it enables him to produce *fac simile* of his drawings; and the merchant finds it useful to facilitate the carrying out of many of his transactions.



## THEORY OF LITHOGRAPHY.

To enter into the minute details of the theory of Lithography would be too voluminous; and, therefore, we merely append a few simple principles which the process of Lithography depends upon:—

1st. The facility with which water is imbibed by the calcareous stone and all porous bodies.

2nd. The penetration or the strong adherence of greasy bodies to the calcareous stone.

3rd. The affinity greasy bodies have to each other, and their repulsion by water.

The result of these principles is the basis of Lithography, for—

1st. If a greasy line is traced upon the prepared stone it adheres so strongly that it cannot be erased without removing the surface of the stone whatever means may be employed, whether mechanical or chemical.

2nd. All those parts of the stone not covered with a greasy body receives and maintains the water until evaporation takes place, when the stone is left in the same condition as before the water was applied. It therefore results, if a roller charged with a greasy ink is passed over the stone, the grease attaches itself only to the greasy lines previously traced, and is repulsed by the moisture which remains on the surface. It then remains that the medium

to be employed—in the shape of inks or chalks—should be composed of a greasy compound, to penetrate into the stone, and to adhere in such a way as to resist the action of the repeated damping the stone is subject to in course of printing. Soap, wax, and resinous compounds accomplish this end.

Gum and acid are two indispensable agents also employed, and their action is as follows:—

Gum is absorbed in the pores of the stone, and by some is considered to fill them up, and thus prevent their occupation by grease. Be that as it may; if a stone be washed over with a solution of gum, however thin, grease will not adhere to those parts which have received it

Its application, therefore, is to prevent the greasy lines from spreading or thickening, and also to prevent the surface of the stone not drawn upon being susceptible of receiving fresh grease.

The action of acid is to destroy the surface of the stone, and all that is contained thereon; it is therefore employed to remove dirt, &c., and to give a sharpness to the artists drawing or to the writing on it.

## LITHOGRAPHIC STONES, AND HOW TO SELECT THEM.

THE lithographic stone is calcareous, very fine and compact, and found in layers of different thickness in various parts of the globe, more particularly in Germany, France, and Italy; but the finest qualities are brought from the quarries of Solenhofen and Pappenheim, in Bavaria.

Those found in France are of an inferior quality, and are only fit for very common work, such as circulars. The subject worked from these stones has a tendency to clog up and become thick, and they are, moreover, very liable to break while printing; therefore, preference should be given to the German Stones.

The following is the analysis of the stone of Bavaria:—

Aluminous salt and oxide of iron . . . 2

Carbonate of lime . . . . . 98

There are three qualities used for printing.

FOR CHALK DRAWINGS.—A stone of the finest quality should be selected, which is of a bluish cast of colour, free from veins or chalk marks, and perfectly even colour.

FOR ENGRAVING.—The hardest should have the preference, which is usually a rather lighter colour than those described for chalk drawings.

FOR INK WORK, such as writings, plans, and ordinary transfers, the yellow or white stone, being softer, answers

every purpose, care being taken in the selection that they do not possess chalk marks, as, in the course of working and the action of acid employed, they wear in holes.

To see the quality of a stone, the best method is to pass a damp sponge over the surface. The quick absorption of water is an undisputed proof of a stone being soft. A hard one, on the contrary preserves the moisture for several minutes. Veins, fissures, or crystallization exist in some stones, and should to be rejected if intended for fine work, more especially engraving, for where a large number of copies are to be printed the printer's ink frequently penetrates the defects and prints them with the subject.

The white spots and streaks, technically called chalk marks, are formed of little holes filled with chalk, which should be carefully avoided for fine work, as they invariably increase in size and number as the stone is reduced by grinding and polishing; but if not very bad, and the stone is to be used for ordinary commercial work, they need not be regarded with great fear, while they remain intact, which they frequently do. Some stones are composed of thin layers which may be detected by examining the edges; they invariably come asunder while in process of working.

Care should be taken in the selection of a stone to see that it be perfectly even both on the face and back. The surface should be tried with a straight-edge, and the substance with a pair of callipers.

## PREPARATION OF THE STONES.

THE lithographic stones when imported are but roughly polished, and require a thorough grinding, in order to effectually remove scratches, or any portion of grease they may have come in contact with, and so render them fit for use. This operation is accomplished by rubbing two stones together, face to face, with silver sand and water. The sand should be sifted through a coarse wire or hair sieve, and the water scrupulously clean. An instrument is used for this purpose which is termed a levigator, and is composed of a heavy flat piece of iron with a handle near the edge, and perforations, in which sand is placed; water being added, and a rotary movement given, the sand passes through the perforations on to the stone. We have had these instruments in use for several years, and find them very effective both for perfectly and speedily erasing the subject, and reducing the stone evenly.

It is necessary that this process be performed for every variety and nature of subject that the stone is destined to receive.

In the absence of the levigator, two stones of nearly the same size, colour, and durability intended to be ground are washed well with clean water, one is to be placed face upward, perfectly level on the trough, a small quantity of



sand sifted upon it, and water added. The second stone is then placed on the top of the first, face to face, and is moved backwards and forwards with an occasional rotary motion. After about twenty minutes the stones are to be transposed, and the grinding continued for about twenty minutes longer, adding fresh sand in its progress, which must be finely ground before commencing the next process. On removing the upper stone let both be well washed with clean water to remove every particle of sand, try the two stones with a metal straight edge, and, if not perfectly level, grind again.

FOR POLISHING.—After having removed every particle of grit with a sponge and water, take a good sized piece of soft pumice-stone, and, with plenty of water, pass it backwards and forwards until the grain occasioned by the sand is entirely removed. Wash well again, and take the water ayr-stone (snake-stone) and apply, with abundance of water, the same way, until the stone is very smooth. The time consumed in grinding or erasing an old subject, varies according to the nature of the work, whether fine or heavy; also the time it has been upon the stone, a heavy subject having been on a long time, necessarily requires more grinding than a fine one only recently transferred.

The polishing, with pumice and snake-stone, should take about twenty minutes each.

FOR GRAINING the stone a less amount of polishing is

required, but if scratches exist they must be entirely removed. Wash the portion of the trough that the stone rests upon, and use great precaution to free it from every particle of sand or grit previously employed, (a clean sponge is very useful for this purpose;) place the stone on the trough as if for polishing, and with a sieve (the fineness to be determined by the nature of the grain required) sift the sand upon its surface and moisten it with water; place a second stone, the same size, face to face, and with it describe the smallest possible circles, keeping them as regular as practicable, revolving the stone one way. A much smaller stone is sometimes useful, in the event of the grain not being even, but caution must be observed in its use, as it may probably destroy the evenness of the grain. Many grainers employ only the small stone; but, in our opinion, the process is not so speedy or effectual, as when two of the same size are used; by the former process two stones are grained at the same time. It is important that the two stones should be of the same character, as it is impossible to obtain a good grain if the one is soft and the other hard.

When the required grain is obtained, carefully remove the top stone and wash well with clean water; turn both on edge to dry.

The quality of the grain is very important, and the success of the artist depends greatly upon it.

It should be examined with a glass; but, to an experi-

enced eye, it is easily determined by examination at an angle.

During the process of grinding and graining, the stones should never be left one upon the other, as, when dry, they are difficult to separate, and will be likely to break in endeavouring to part them; if by any chance they are left and become dry, a knife inserted between them and adding water, is the safest means of separating them.

THE OPERATION OF GRINDING.—Polishing and graining the stone is of most importance in the process, and unless properly performed, success is impossible, as the agent (gum) employed, to render the stone impervious to the action of grease, must, of necessity, be thoroughly removed before a fresh subject can be transferred.

The sharp edges and corners of the stones should be rounded off with a rasp and pumice-stone every time they are ground, whether for polishing or graining, as they are apt to dry, and take the ink during the process of printing.

## BACKING OR DOUBLING.

THE unevenness and thinness\* of some stones render it imprudent to work them, and run the risk of their breaking, to obviate which it is necessary to back them, that is, to place either a stone or slate slab on the back of the one intended to be worked. This is a very easy matter, and is accomplished thus:—Take a stone or slate that is intended for the back; place it on the trough, rough side uppermost, and moisten both with a damp sponge; mix the required quantity of plaster of Paris in a tub or basin, or upon the stone to the consistency of thin paste; place the stone to receive the back carefully upon it, and move it gradually backwards and forwards to bed it well in the plaster; wash the edges, to remove the superfluity, and, when dry, it is fit for use. A small iron chisel inserted between them will easily separate them.

Where thin or unequal stones, having two faces and subjects to be preserved upon them are to be backed, paste a thick but fine piece of paper upon the face that has the subject upon it, not then required, and proceed as above.

Where a stone is thicker at one end than the other, thick paper folded so as to gradually taper off at the end, should be placed under it, the thickest part to be placed

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\* It is not safe to work a stone thinner than  $2\frac{1}{2}$  inches.

under the thinnest end of the stone. Care must be taken that the termination is not too abrupt, or a broken stone will be the consequence.

If a stone is broken in course of working, in many cases where the pieces are not too much shattered, they can be backed on another and the job finished; if this is not practicable, tie round with a strong cord and take a *retransfer*, and transfer to another stone.



## THE PRESS.

SINCE the introduction of Lithography there have been many descriptions of presses manufactured. We consider it unnecessary to draw attention to more than two.

The French or Star press, is preferred by some for working drawings and colours, where nicety of register and regularity of impression are required; but being a slower and a more expensive machine, it does not, in our opinion, possess equivalent advantages.

The English, or Side Lever, is the press invariably worked in this country, and any results can be obtained by it.

The FRAME should be of iron, firmly made to stand the necessary impression of every kind of work.

The CARRIAGE, or bed, should be perfectly even, and made of dry wood. Iron bands at the bottom, which must be immediately replaced if (as sometimes occur) they come off whilst working.

The CYLINDER should be turned perfectly even, and oil or grease must not be allowed on its surface.

The ECCENTRICS which raise the bed to the scraper are often defective through being made too short, thereby not allowing sufficient play between the stone and the scraper, which is detected by the difficulty of the return of the bed after being pulled through under pressure.

The larger sized hand presses are advantageously worked by steam. The bed is made to pass under the scraper, and returned to its original position by simply depressing and elevating the lever, so that the cost of an extra hand, or "puller," is saved, and a large stone can be worked with as much ease to the printer as a small one.

The press should be fixed to the floor by screws, and the bearings kept well oiled.

## THE SCRAPER

SHOULD be made of well-seasoned boxwood, and must not be worked with too sharp an edge; we would recommend the use of a slip of leather, which should be placed over the edge and tacked at each end. It is desirable to have a good stock of scrapers in working condition, the size of which should be governed by that of the subject; on no account use a scraper longer than the stone, as the ends protruding are likely to injure the tympan leather; if the scraper is used without leather, and is uneven, place a sheet of coarse sand-paper on the stone to be printed from, and rub it down to it, and pass a small portion of grease along it before using. In the event of the surface of the stone being uneven, leather on the scraper is very convenient, as a piece of paper can be inserted between the scraper and the leather where the unevenness occurs.

## THE TYMPAN.

THE tympan consists of a frame attached to the bed, and the leather stretched on it. The frame should be strongly made to bear the necessary pressure of the tympan being tightened. The tympan used are of leather, thin sheet brass, or zinc; the first is more generally adopted, and where the press is employed for miscellaneous work, only recommended; for commercial work, where expedition is to be desired, those of metal work much easier, and, with careful usage, last a longer time; the preference should be given to brass; as the zinc is apt to split and spoil the scraper.

When colour stones, or drawings are to be printed, a leather tympan is to be preferred.

Before fixing a leather tympan, see that the grain *runs from* that part of the frame to which the hinges are attached, or the friction of the scraper will destroy the leather after a short time.

Grease is employed in dressing the leather, which, when the leather is new, soaks through it and soils the backing sheets, so that these must be frequently replaced, or they will adhere to the stone. Black lead, mixed with a little tallow, applied occasionally, is the best mode of greasing the tympan, which must be done to enable it to pass easily under the scraper.

A new tympan leather wants humouring, and should be pulled through the press with a light pressure over a stone the full size of the bed, and be gradually tightened by turning the screws at the end of the frame, until all wrinkles are removed from the leather, and it ceases to stretch.

Some stones, although thick enough for working safely, require packing underneath; an even board to fit in the bed of the press, and three thick mill boards, and a sheet of Kamptulicon are therefore necessary.



## THE PRINTING ROLLER

Is a cylinder of wood varying from 10 to 20 inches in length, and from 10 to 16 inches diameter, (the usual size is 12 inches circumference, 11 inches long,) with two axles at the ends to form the handles, which should be made of harder wood than the cylinder.

This cylinder is covered with one or two rolls of coarse flannel tightly sewn, forming a casing—care being observed that the seams and ends do not overlap each other. This is again covered with a piece of leather evenly sewn. If for black work, the rough or grained side should be outside; but if intended for color, the smooth side of the calf leather should be outside, to enable its being washed with turpentine. For tints, a rough grained roller works better than a smooth one. A separate roller should be used for each class of color, such as one for red, yellow, and warm tints, &c., another is required for blue, green, &c.

The calf-skin employed for this purpose, must be of the finest description—the grain fine and equal, the perfect selection of which, even by the experienced printer, is by no means a certainty, as its quality cannot be determined until it is in working order. A good skin is often spoilt in preparing it for the work it is destined for. The means of getting a new roller into working order is as follows:—Soak it in thin varnish for twenty-four hours, occasionally rolling it on the slab; after which it must be carefully scraped

from end to end, and a fresh quantity of varnish added, and the same process must be repeated several times; it should then be used for common work. The skin will now be found to have stretched and become loose, it must be taken off and another roll of flannel placed on and the skin pulled tight by the cord at its ends, care being observed that inequality does not exist in any part.

A hard roller, not having been much used, is best adapted for chalk work. After long usage, the quantity of ink absorbed in the skin renders it unfit for printing fine tints, but it may be reserved for printing weak and fine ink work by adding one or two more rolls of flannel. A new roller requires a greater quantity of ink than an old one.

The roller coming so continually in contact with the wet stone, of necessity imbibes a portion of the moisture, this is highly detrimental to the attainment of good work, to obviate which it is necessary that each press should be furnished with two or more rollers in good working condition, to be used on alternate days, so as to allow time for the moisture to evaporate. The one not in use should be carefully scraped and placed perpendicularly in a rack, which should also be done at the end of a day's work. If likely to remain out of use for any length of time, the roller should be *rolled up in Russian tallow or oil, to keep it in condition*. These instructions, although important for every class of work, should be more particularly observed if intended for color work.

In the event of a roller becoming deteriorated by the seam bursting, the wood warping, or the flannel rucked, on no account continue its use, or a good skin may be sacrificed.

THE INKING SLAB, a thin lithographic stone, about 19 by 15 inches, of inferior quality, is fixed in a convenient place on the bulking. An iron table, made expressly for the purpose, is more compact, and answers every purpose for black ink, but is not recommended for color.

It is as well to have a drawer or cupboard with a rack for the rollers when not in use, and a shelf to contain a small quantity of each of the things required.

## NECESSARY MATERIALS

DISSOLVED gum arabic, diluted nitric acid, water, middle and thin varnish, printing ink, turpentine, green oil, damping cloth, three sponges (one each for water, gum, and acid,) two palette knives, tracing point, eraser, wooden point, roller and handles, oil can, and a parallel rule, square, boxwood scrapers, rasp and sand-paper, sieve, and fine sand, snake-stone, pumice-stone, damping canvass, transfer paper and ink, ruling pens, lithographic writing pens.

## TRANSFER LITHOGRAPHY.

TO PRODUCE WRITINGS AND INK DRAWINGS ON  
TRANSFER PAPER.

THE proper *Ink* for producing the Lithographic Manuscript, being better preserved in cakes, is to be rubbed off in a warm saucer, and a few drops of boiling soft or distilled water added (as Indian Ink) working it with the fingers until it becomes the consistency of thin cream; then placed in a small stopper bottle, to exclude it as much as possible from the air; in this state it will keep fit for use, several days. Should it, however, thicken, or refuse to flow freely, a fresh supply must be made, rather than attempt to dilute it. In warm weather, when the ink is exposed to the atmosphere, it will require frequent renewal. Fluid transfer ink can be obtained which answers every purpose.

The *Pen* best adapted for clear productions, is the *Lithographic Pen*, the delicate character of which requires some experience to work with; it produces a fine, clear, and solid line, which no other description of pen can approach; while its elastic nature needs more than usual care in its management. The finest ordinary steel pens and crow quills are the next best for use; the former however, are wanting in elasticity, and the latter requires so frequently repairing, that they fail to produce an equal



character of writing, which is so essential to ensure a successful production.

It must always be borne in mind that, however fine the line, a body of ink is necessary to ensure a clearness in the transfer, which the peculiarly elastic character of the lithographic pen, above all others, will most readily supply, particularly if produced by a single line, while the latter description of pens frequently disturb the surface of the composition; and when that is the case, however slightly apparent the injury may be, the writing or drawing is in danger of being spoilt in the process of transferring.

For *Ornamental Work*, where breadth of line is required, the *cut sable brush* will be found most serviceable, as it will the more readily apply any breadth without disturbing the composition of the transfer paper.

For *general ruling or tabular subjects* the lithographic ruling pen is used; this will be found invaluable for all descriptions of work, interspersed with perpendicular, parallel, or curved lines, taking the precaution at all times to supply it with a quantity of ink sufficient to produce the line *at once*, as a second passing over the same line will be liable to disturb the surface of the paper, and thus prevent that clearness in its ultimate effect, which one operation only will produce.

## THE TRANSFER PAPER.

THIS requires more than usual cleanliness and care, seeing that the smallest soil from dust, fingering, or other exposure, though not at the time perceived, will endanger the safety of the work produced. The transfer paper should be ruled, either with a blunt metal point, on the *reverse side*, or a black lead pencil on the surface ; the former expedient is, perhaps, the best, as it is a security against soiling the surface, and will be a sufficient guide for all ordinary purposes of the writer. If the subject requires direct tracing, by placing a sheet of red paper between it and the surface of the transfer paper (both of which must be fixed to prevent shifting), a point in the ordinary way will give the tracing ready for inking.

A clean slip of paper, kept under the hand, to prevent it from coming in contact with the transfer paper, is essentially requisite, and especial care must be taken that the writing or drawing is preserved from being rubbed, observing that the character of ink used is of a nature to remain wholly upon the surface of the paper.

Corrections are, where possible, to be guarded against, seeing that, with the utmost care, they entail a defect of a greater or lesser magnitude in the production ; but when they are inevitable, it is best to rub out the part with a

piece of clean linen moistened with turpentine ; then use India rubber, until every vestige of the former writing be removed. This operation will require great care to prevent any of the surrounding parts from being smeared, which, if done in the slightest degree, will, when the subject is in the hands of the printer, and charged with ink, give much trouble, and probably endanger the entire transfer, before it is capable of producing satisfactory impressions.

For *fac-similes* the *transparent transfer paper* is used ; this being strained and fastened over the subject to be produced, the writing or drawing is traced, either with the pen or brush, according to its nature, and requires the same precaution as before stated.

Transfer paper may be preserved for any period if kept dry and protected from injury.

The preceding observations apply equally to every character of *ink drawings, maps, plans, elevations, &c.*, executed by the process of transfer, for which the use of transfer paper is found more convenient than drawing the reverse way on the stone direct ; remembering that all work in being *shaded only with lines*, presents the appearance of an etching, and is not capable of receiving any description of shadows beyond those produced by the fineness or breadth of the line, as in an ordinary pen and ink drawing. These observations are deemed the more necessary, as it has frequently occurred, in our experience,

that modulated tones have been washed in to produce the effect of an Indian ink drawing, which, though pleasing to the artist, of necessity, when transferred, receives the printing ink alike *solidly*; and is incapable of imparting the effect anticipated.

## TRANSFERRING THE SUBJECT TO THE STONE.

SELECT a well polished stone, perfectly dry, slightly warmed and well dusted, rather larger than the paper the subject is to be printed upon, and with mill board adjust to the press, taking special care that the fingers do not touch the surface of the stone, which can be obviated by placing a clean sheet of paper upon it. See that the scraper is perfectly level with the stone, lower the tympan, having previously tied against it a card or a sheet of thick paper to intercept the grease contained in the leather, push the carriage with the stone forward until brought under the scraper, pull down the lever, lower the scraper by means of the screw until it reaches the stone, raise the lever, and give another turn of the screw.

The requisite degree of pressure cannot be described, but a very limited experience will enable any one to estimate the "pinch" necessary to transfer the writing from the paper to the stone, and to obtain impressions afterwards. If, after trying the pressure at both extremities of the stone, more resistance be felt at one end than at the other, which may be either owing to the stone or carriage being of unequal thickness, lay a few folds of paper under the thinner end, taking care to taper off the folds gradually as they approach the middle of the stone



(if the stone should be removed, of course, care must be taken not to reverse its ends). After this adjustment, pass the stone two or three times through the press, from end to end, to cause the edge of the scraper to approximate, as nearly as possible, to the surface of the stone.

Next proceed to damp the transfer paper on which the copy is written. Lay down a sheet of blotting, over which place the transfer paper, with the writing downwards; with a sponge, moistened with water, wet the back of the paper equally, holding it down by the margin, or with the least possible pressure of the fingers on the writing, taking especial care that no moisture be allowed to reach the under or prepared surface; continue the damping till it lies flat, and until the under side slightly adheres to the finger when pressed against it. The damping may be continued for several minutes, depending upon the disposition of the paper to receive moisture; lift the transfer by the two diagonal corners, and place it, with the writing downwards, on the stone in the required position; the sheets of paper used previously to adjust the pressure, may be laid over the transfer; bring down the tympan gently, let the carriage be pushed forward till the end of the stone is advanced about an inch beyond the scraper's edge, apply pressure, and pass the stone under. This may be repeated four or five times, with a slightly increased pressure, of about half a turn of the screw, on the whole number, not on each repetition.

Raise the tympan, remove the paper that covers the transfer, and, if it adheres to the stone and is perfectly and evenly pressed, wet the transfer again, reverse the stone, replace the paper, and pass it under the scraper as before.

If the transfer paper has been sufficiently damped, the edge of the scraper level, and all other details attended to, the whole of the writing will have been transmitted from the paper to the stone. The transfer paper adheres with considerable firmness to the stone, it must therefore be soaked in order to remove it; allow the stone to dry, and let it be gummed entirely over its surface with a sponge used only for that purpose.

## TO PRINT TRANSFER WORK.

THE stone being now fixed in the carriage of the press, the gum is to be washed off with a sponge and water, and damped equally with a piece of damping *canvass*; this is better than sponge, as it more equally diffuses the moisture necessary, the management of which requires much nicety, experience, and skill.

The inking table and roller, being first scraped clean, the latter is supplied with ink, spread over it with the palette knife (say in quantity about the size of a nut) and well worked backwards and forwards on the inking table, for equal distribution. The roller must be passed several times, firmly and equally, over the table; and it is necessary to raise it frequently in rolling, in order to vary the points of contact. To properly charge the work to be printed with the ink, it must be applied uniformly, and it is advisable to hold the handles of the roller firmly, to bear hard on the stone, and to roll it in a somewhat oblique direction. The rolling should be finished by passing the roller a few times over the stone, with less pressure, by which operation the superfluous ink, if there be any, is removed. It will be found, on first charging the subject, that the slightest marks which have been caused by the handling of the transfer or stone, will have taken the printing ink, and which must, in that stage, be immediately removed; if on

the margin, and unconnected with the work, by a small piece of pumice-stone and water; but if in connection with the work, then remove such with a sharp knife or eraser, taking off the same smoothly; this being done, and the subject found to be perfect, take a sponge saturated with diluted acid, the strength of which must be governed by the nature of the work, and thoroughly, but lightly, wash the entire surface of the stone, taking especial care that the printing ink be not rubbed, otherwise the acid will destroy such portions, and prevent those parts receiving their due share of ink to enable the impression to be perfect; the acid may now be washed off, and the surface covered with dissolved gum, which, upon being removed with the water sponge, and the stone damped with canvass, is ready for printing. It is not advisable to repeat the passing of the roller too often, as the stone then gets dry, and is liable to be soiled; if this should happen, however, it must be carefully wiped with the damping canvass, and rolled briskly till perfectly clean; if neglected till the stone is dry, it will be very difficult to clean it again. A little observation and care, to keep the stone damp while rolling, will avoid this danger; with beginners this, however, produces other inconveniences, as the fine lines are liable to be wiped off, and the roller gets wet, the detriment of which has already been mentioned. Too much printing ink on the roller and slab, or using it too thin, is an error which the

inexperienced printer often falls into, and is also done by the slovenly workman to enable the subject to be more easily charged. This habit should be rigidly checked by the employer, as it is impossible to obtain a good and clear impression when such a course is pursued. It is also the cause of the work setting off—so prejudicial to its appearance.

Too much attention cannot be paid to this as well as working the stone as slightly damped as possible.

Let it be noticed that the printer has it in his power, by his mode of rolling, and the quality of his ink, to give any degree of intensity to the impression. The ink is given very freely, if the roller be worked slowly backwards and forwards with considerable vertical pressure. Less ink will be imparted if the rolling be brisk and light, or, following the same rule, ink may be taken up or withdrawn, so as to produce a pale copy. The consistency of the printing ink determines and modifies the rolling-in; slow rolling, with thin ink, thickens the lines, and causes “blocking,” by which is meant a joining together of letters, &c., in a mass; free rolling, with a stiff dry ink, gives very pale impressions. It may then be inferred, from these statements, that either sharp rolling with thin ink, or slow and heavy rolling with stronger ink, is all that is necessary to obtain good copies. Purer and better impressions, however, are obtained by using only a small quantity of ink of medium consistency.



It is necessary to have in store printing inks of two or more strengths, to be used according to circumstances, as the consistency of these inks is sure to vary with the temperature. In warm weather, the oily varnish of the ink generally becomes liquified to a considerable degree by the heat; the stone also, by increased temperature, causes the water on its surface to speedily evaporate, and the writing itself is liable to become blocked. Circumstances of this nature should be early attended to, because the blocking, if suffered to go on, will be very difficult to remove; should, however, a tendency of the writing to become blocked present itself, it may be certain that it is caused by the defective manner of using the roller; to remove the effects of the blocking, take a piece of clean flannel dipped in gum water, and gently rub the whole writing to clean off the superfluous ink; remove the ink from the roller and inking table with the palette knife, substitute ink a degree thicker, and roll it briskly until the writing assumes its original clearness.

In hot climates much difficulty is experienced by these causes, to remedy which very stiff and dry ink should be used, and two persons employed at the press, one to wet the stone, and another to roll in the ink immediately the stone has been properly wetted. A very small quantity of a solution of gum may be poured into the water employed to wet the stone, in order to retard evaporation (if much be added, the roller is apt to slip).

Lowness of the temperature occasions inconvenience, which can be more or less controlled. Frost will thicken the oil, causing, therefore, the subject to be charged with difficulty, and the impressions grey and unequal; but these may be quickly obviated by the printing-room being heated to a moderate temperature.

## INK DRAWINGS ON STONE.

DRAWING and writing *direct* on the stone have many advantages over the transfer process, some of which we mention:—A finer and sharper line is more readily obtained, and the subject will bear a larger number of impressions printed from it; stretching, which is inevitable in transferring from paper, is entirely obviated. Its applicability will be better understood and appreciated by practice, which, in this part of the process, is indispensable to the attainment of good results.

The polished stone is more sensitive to the action of dirt, grease, and smears than the transfer paper, and in the place of a sheet of paper for the hand to rest on, it is desirable to have a flat board, bevelled at the edges, and placed over the stone, resting on either a piece of folded paper pasted on the margin, or two blocks of wood placed at its sides, to slightly raise it from the surface, as, by the use of paper, pieces of dirt are likely to get between it and the stone, which, by the pressure of the hand, are of necessity smeared on the stone, and print to the detriment of the subject.

The stones best adapted for this work have been already treated of under their proper head; too much attention cannot be paid to the removal of dirt and grease stain,

and to the polishing; and, before commencing, the artist should convince himself that this has been perfectly completed.

The breath—if allowed to come in contact, more particularly in winter—produces a dampness upon the stone, which should be allowed to dry before proceeding to work on the moistened part, or the ink will not adhere; experience alone can prevent this.

The saliva, it must be borne in mind, has the same effect as gum, and, if allowed to come in contact, the part must be polished with either pumice or snake-stone and clean water, before it will receive the ink.

For an ink drawing, a correct tracing reversed on the stone, is requisite before the subject is commenced with the lithographic ink, and if any parts be made out with a black-lead pencil, it must be drawn with a hard one, and the lines extremely fine and delicate, otherwise, if a thick line be drawn the portions of lead existing between the face of the stone and the ink, will hinder the latter from adhering, and the work will appear faulty where the pencil has been applied. The best method is to make a correct outline of the subject on tracing paper, with ordinary Indian ink, and fasten the same to the edges of the stone with wafers or gum, and place a sheet of *red tracing paper*, with the coloured side to the face of the stone underneath, and with a blunt tracing point go over the outline of the subject, taking care that the tracing be not in any way

shifted, or the fingers allowed to press too heavily on the surface, this gives a correct outline ready for inking. It is advisable, in elaborate subjects, to allow the tracing paper to be *kept* fastened on the *upper edge* of the stone, until the drawing is completed, in case it should be found that any omissions may have been made in the tracing with the point; by this precaution you will be enabled to draw it again over the surface, and re-trace those parts omitted, in precisely their proper position, which might otherwise be a matter of considerable difficulty. When the red tracing is completed the stone must be well dusted and all superfluous matter removed, as any particle of dust will seriously affect the clearness of the artist's drawing.

For expedition, the tracings are made with red chalk pencils, on the tracing paper, and on being fastened with gum evenly to the top of the stone, the back is well rubbed with a smooth ivory folder, being especially careful it is not shifted, when an outline may be procured, thus avoiding the time of the second tracing with the point; however, much danger is incurred of thickening and blurring the lines, by the expansion of the paper, and thus rendering it a questionable matter of economy: at best, it is not advisable to attempt subjects beyond five or six inches in length.

The tracing being now completed, it remains only for the artist to examine the quality of the ink, which must



be dissolved in the same way as for writing transfers, but a little thicker. Generally speaking, as the ink is now manufactured, the *colour* will guide the artist as to its possessing sufficient body; if too thick, it will refuse to flow freely, and if too thin, the fine lines will not retain sufficient body to allow of their printing; a little examination on this head, observing whether the ink shows a tendency to spread on the stone, will enable the artist to judge if it be of a sufficient consistency. It is advisable to dissolve only a small quantity at a time. By standing, the colouring matter will settle to the bottom, and thus the ink may assume, after some hours, a paler colour; this will not interfere with the safety of the artist's production, inasmuch as the colouring matter is introduced only for the purpose of aiding the sight.

Having observed the above precautions, proceed to ink the tracing, for which purpose the cut sable brush will be found invaluable, in connection with the *lithographic* pen, for many portions of an ink drawing, seeing that any breadth or fineness of line is readily accomplished, though the delicacy of the point as with the pen, requires some additional care in using them, always bearing in mind that *alterations* are best avoided. In connexion with the pen and sable brush referred to, a ruling pen is necessary for linear work, which must be carefully cleaned before using, and charged with only a limited supply of ink, trying it on the edge of the stone, or on a piece of clean paper;

before using; the same precaution, is more particularly necessary in cases when the bow-pen is used for circles, curves, &c., especially taking care to obtain a *firm* centre point in the stone with an etching needle; otherwise, from its smooth character, it is likely to slip, and thus seriously endanger the subject.

Every part of an ink drawing ought to look solid and well fed with ink; if it has not that appearance, it will not print well.

The different effects or depths of color in ink drawings are to be produced *by thicker or thinner lines*, crossed in various directions, as in copper-plate etching, the ink being always used equally thick. It is a mistaken idea to suppose that by using the ink thinner for the distance, and thicker for the parts nearer to the eye, they will obtain a better effect. It appears so, certainly, to the eye, so long as the drawing is not charged with printing ink; but when printed, either those lines which were poorly fed will break up and not print at all, or else they will print as black as those which were drawn with thick ink, and completely destroy the intended effect of the drawing. It is, therefore, to be remembered that in making a pen and ink drawing the ink must not be altered, but all the lines kept as black as possible, and a varied effect produced merely by the fineness or thickness of the lines.

When two or more lines run together in the execution of the drawing, as often occurs, the defect may be easily

rectified by using a sharp point to pick out such lines as are not required, bearing in mind that such parts of the surface so disturbed are rendered unfit to receive additional work.

## TO PRINT INK DRAWINGS.

ON receiving the drawing from the artist, it is first necessary to gum over the stone entirely. The stone being fixed in the press, with a scraper fitted thereto, the gum is washed off with clean water and the stone dampened with the canvass; carefully charge it with the printing roller, taking precaution that the ink is somewhat thicker than that used for a transfer subject. Carefully roll the subject, taking care the stone does not become dry; it may be necessary to damp the stone several times, and as often charge the same, until every part has received its due proportion of printing ink; the latter rolling allow to be *more brisk*, so that any parts which may show a tendency to become overcharged may be cleared by the increased action of the roller.

It frequently occurs that upon the subject being rolled up innumerable spots present themselves, which in most cases arise from the hands being placed through the hair, and so displace dust, which falls on the stone. If acid of a medium strength does not remove them, an eraser should be used.

Having now carefully examined the subject, proceed to clean the edges of the stone, if they are soiled, with a small piece of pumice-stone and water; and any spots which may elsewhere appear, remove smoothly, but effectively,

with an eraser: this being done, take the sponge used for the diluted acid and pass over the entire surface. The strength of the acid must be governed by the character of the work; if of a delicate nature, its strength may be best tested by tasting, which, if somewhat stronger than vinegar, will be sufficient; if a heavy drawing, then increase the strength of the acid until a slight effervescence is produced when applied to the stone, which can be readily ascertained by a drop being placed on the margin. Having now the stone perfectly clean from soils, wash it with the water sponge, and afterwards *gum* over the entire surface, not omitting the edges of the stone; the gum being again washed off, the printing can be proceeded with, observing the same rules as given in the printing of transfer work, bearing especially in mind that the stone must not be allowed to get dry; it should be damped *immediately* on removing the printed paper, and protected by a *thin coating of gum whenever left*, even for a short time.

If at this stage the work appears weak and rotten, it arises either from the writing ink being too thin and wanting in body of grease, or from the stone being imperfectly polished, or from having had dirty water used in its preparation, and it must be subjected to the following treatment:—

Slightly warm the stone and wet with water, and rub over the subject a piece of woollen cloth or flannel saturated in green or palm oil, which removes the ink

from the subject. On the application of the roller, it readily reappears, and if not then perfect, the same treatment may be repeated as often as found desirable.

If this remedy fail, the last hope is to neutralise the gum by passing over the stone a *weak solution* of acetic or tartaric acid, well wash, allow to dry, and pass over the weak part with strong ink with the pen or brush.

The preceding instructions refer alike to every description of work produced by writing or drawing.



## GENERAL REMARKS.

As soon as the surface of the stone has been washed over by the slightest portion of gum in solution, it is no longer in a state to receive any fresh work ; therefore, erasures and corrections, where practicable, should be avoided — as they at all times endanger the safety of the work. If the alteration be of a trifling nature, the part is to be washed free from gum, and the surface removed with an eraser, or a small slip of snake-stone, and, when perfectly dry, the correction made backwards direct on the stone ; should, however, the alteration or an addition be such as to require partial re-writing, first examine to see carefully if every part intended to receive the new work is perfectly free from the old, which must be thoroughly removed, gum that portion of the subject which is correct, and allow to dry, then rule with a pencil on the stone a line to correspond with one on the back of the transfer paper, which carefully damp. Lay down the transfer on the part so prepared ; over which, place a sheet of clean paper, and proceed as for transferring a new subject. Great care must be taken that the transfer paper be not shifted in bringing down the tympan, or in passing it under the press.

The remaining part of the work will now appear doubled from having set-off during the above process ; that, how-

ever, is of no consequence, and is readily removed by wetting the stone and passing the roller over until it is quite clear.

If the paper be of a soft description, and free from acid, a skilful printer may take five or even ten thousand impressions from a stone.

A machine-made paper is best suited for lithography.

If two pages be wanted on the same leaf, the first must be printed in the usual way; but in order to do the second, lay a fold of thin paper over the first page, to intercept the printing ink not yet dried. These set-off sheets may be used from time to time, when thoroughly dried.

The lay or register should be made with a piece of type metal, as it remains visible, and is not removed by the repeated washings, and does not take the printing ink, but it should be gummed over before printing.

## PRINTING CHALK DRAWINGS.

THE drawing must be carefully examined, and the artist convinced that it is complete; after the stone has been prepared for printing, any additions that may be made frequently destroy the quality of the impression.

The stone must now be subjected to the process of etching, which operation invariably decides the fate of the print—if either over or not sufficiently etched, the printing is rendered much more difficult and uncertain. Before etching a drawing, the printer should make himself acquainted with the following particulars:—

1. Whether the stone is hard or soft.
2. The quality of the chalk and ink employed.
3. The style of the artist.
4. Whether recently drawn.
5. The temperature of the printing-room.

A hard stone more effectually resists the action of the acid; a soft one, on the contrary, is more easily affected, and, therefore, a weaker solution should be used for the latter than the former.

The ingredients of the chalks vary considerably, and their nature should be known by the artist, as some possess more grease than others; for instance, copal chalk is harder than No. 1 and 2, and does not possess so much grease, and it therefore offers less resistance to the action of the

acid. This point demands great attention. There is, also, a great variation in the style of the artist; some having a firm touch, whilst with others it is more feeble: the latter is a fault that amateurs very frequently commit. The former style prints better if strongly prepared; the latter must be treated more carefully, and with a weaker solution of acid.

If a drawing has been allowed to remain on the stone a long period, it must not be subjected to the action of so strong a preparation of acid as one recently drawn.

When the temperature is high, it causes the chalk to have a greater affinity to the stone, which should, therefore, be subjected to a stronger etching. In cold weather, this effect is of course reversed, and a weaker solution of acid should be used.

The process of etching is conducted in various ways. Some Lithographers prefer using the gum and acid separately, whilst others use them mixed. The first method is performed by laying the stone on the trough, and throwing over it two or three times a weak solution of acid, which must be well washed off, and the stone is then to be covered with gum. The latter process is the one more usually adopted, and is, in our opinion, undeniably superior, as the gum, checking the action of the acid, causes this important operation to be more safely performed. The following is the way to prepare the gum and acid for etching:—Pure and fresh gum arabic is to

be dissolved in water until of a medium consistency, and into this, nitric acid, diluted with about ten times the quantity of water, is to be stirred. The strength may be tested by dropping a small portion on the margin of the stone and watching its action. If after a few seconds, a slight effervescence occurs, it may be considered strong enough for a subject requiring only a slight etching. The prepared gum and acid is to be placed in a shallow vessel, and, with a *flat camels' hair brush (kept exclusively for this purpose)* it is to be applied to the surface of the stone, drawing the brush only once or twice over the subject, for, by rubbing too much the chalk is liable to be removed. *If the grease rejects the preparation, those parts should be again covered.* The preparation may now be strengthened, and applied to the darker parts only of the subjects, should any exist.

The stone must be allowed to remain in a horizontal position until the coating is dry. The etching being complete, the gum is to be entirely removed from the stone by water.

Many Lithographers wash the subject out with turpentine, but we prefer rolling it up *first*, so as to see the state of the drawing, and if, after pulling off a few waste impressions, the drawing is found to work satisfactorily, that is to say, the half tints appear even and soft, and the darker shades black and bright, the washing out is better dispensed with. But such rarely occurs.

Washing the drawing out is performed thus:—First



damp the stone, and pour upon it a small quantity of pure turpentine, and, with a piece of flannel, rub lightly until the colour of the drawing is removed; wipe it with an old cloth, then damp it with water, and carefully pass the printing roller, which should be charged with thinnish chalk ink, over it.

The subject thus treated usually requires a little humouring, which must be done gradually; a good proof being seldom obtained until after a few impressions have been pulled.

When these particulars have been properly attended to, the stone is ready for the printer. The paper best adapted for printing chalk drawing upon is a soft, or plate-paper, slightly damped.

If on the application of the roller the works appears woolly, and the fine tints deficient, the stone has either been etched with too strong an acid, or not sufficiently ground. There are many means of bringing the weak parts up, some of which, unless carefully used, will spoil the whole production. The safest and most effectual remedy is to warm the stone, pour upon it equal quantities of turpentine and green oil, and rub gently with a piece of flannel; remove the excess with an old cloth, and again apply the printing roller charged with the chalk ink slightly reduced with thin varnish.

Another plan is to rub a little chalk on a wet piece of flannel, and rub over the drawing, but the stone must be previously damped.



These remedies are equally efficacious when the work appears worn after printing long numbers.

When the stone is not in actual course of printing it must on no account be left without being first covered with gum, or the tints are apt to clog up and thicken.

It is seldom that a drawing can be worked without rolling in twice for each impression. The ink should be used stiff and only a small quantity on the roller, which must be well distributed on the slab each time before applying to the stone.

Spots and stains often cause great inconvenience, and are of two kinds. The blacks are caused by particles of grease, and the white by gum or acid. The blacks should be removed by a fine point; but, if they occur on a blank part of the stone, they are best removed with acid.

White spots are more difficult to remedy; the gum preparation opposing the adherence of grease, the only hope is to dry the stone, and pass over it a weak solution of acetic acid, and touch it in with lithographic chalk.

Alterations are, where possible, to be avoided, the result under any circumstances being very uncertain, and in many cases a good drawing is spoilt by making a trivial correction. When it is absolutely necessary, remove the ink from the drawing by pulling off the surplus on sheets of clean paper. Neutralize the gum (to allow the new work to adhere) by passing over the drawing a very weak solu-

tion of lemon juice or acetic acid, which must be afterwards well washed of with clean water ; or wash the part to be effaced with turpentine, applied with a small brush, and afterwards with spirits of wine ; (great care is necessary to prevent these solutions from attacking the surrounding parts,) and when the stone is perfectly dry, the alteration may be drawn in with ink or soft chalk.

Where the alteration necessitates the removal of a large portion of the drawing, the above methods had better be dispensed with, as they are uncertain and are attended with more or less risk. The ink should be removed as before, the faulty part erased with pumice-stone, and the stone afterwards *re-grained with a small piece of stone*, and when dry, it may be re-drawn upon. The portion of the drawing that is not required to be altered must be gummed immediately the stone is dry after the erasure, or the drawing will thicken and run together, a misfortune, which in many cases is irreparable.

After the drawing has been printed and is to be preserved for re-printing, it should be rolled up with a small quantity of ink and mutton suet mixed, afterwards covered with a *thin* solution of gum, and put away in a dry place. Many printers use a thick solution of gum with the idea that it possesses greater preservative properties. This is a mistake ; as thick gum is apt to peel off, and, leaving the subject unprotected, will, of necessity, permanently injure it.

We would here remark, that when a drawing that has not been prepared has to be removed, it should be handled with great care and precaution: it should be packed and carried so as to prevent all possibility of the surface being rubbed. If a case is not used, the surface should be protected with a board bearing on pieces of card or paper stuck to its edge.

When India proofs are required the best Indian paper should be selected, free from spots or acid, and covered on the rough side with clean paste, then allowed to dry, after which each sheet is to be carefully examined, and all imperfect ones rejected. Cut to the required size, and when printing lay it between the white paper on which it is to be fixed, and when slightly moist place it on the stone to a mark, the pasted side uppermost, on the top of which place the sheet of white paper—also laid to another mark—and then pull the impression, when the India paper should firmly adhere. When long numbers are required, the use of the India paper can be superseded by printing in tint.

## ENGRAVING ON STONE.

AMONG the numerous means of reproduction in Lithography, engraving merits a full share of attention. It is particularly adapted to maps, plans, mechanical and architectural drawings and vignettes.

This process is performed in three ways. The first consists in submitting the stone to a preparation which acts on the surface. The second, to cover that surface with a colour to enable the engraver to see his work. The third is to introduce in the engraving a substance analagous to lithographic ink, and capable of resisting the repeated washings to which it is subjected during the process of printing.

The stone must be chosen free from chalk marks, veins, scratches, and holes. Those of a grey or blue cast are to be preferred. The polish should be high, after which it is necessary to examine through a glass, as the presence of imperfections cannot always be detected with the naked eye, and they stop the graver in its course.

The stone is to be placed horizontally on a table and covered with a very thin solution of gum, with a little colour mixed with it, to allow the artist to see his progress. This coating preserves the surface of the

stone from the contact of greasy substances, but it is absolutely necessary that the gum should be used *in a small quantity*, or the graver will not penetrate through its surface to the stone.

Engraving on stone is performed differently to copper or steel, the ordinary graver being replaced by fine points, or a diamond. A needle point answers admirably, as the effect is obtained by scratches.

The engraver should be provided with a flat camels' hair brush, to remove the dust which works out of the stone, as it is better than blowing off and running the risk of spotting with the saliva, the danger of which has been before mentioned.

It is a great error to suppose that deep incisions are required to produce clear and firm lines. On the contrary, a light and regular depth should be retained throughout the whole work to produce a clear and perfect impression.

When the etching is completed, a greasy liquid (oil is the best) is rubbed into the cavities which have been made by the etching point, and allowed to remain about an hour. After the superfluous oil or grease is removed, the gum is to be washed off the stone, which is then in a fit state to print from. It should be particularly observed that water or any moisture must not be allowed to come in contact with the stone during the process of engraving.

Should the artist wish to see the progress of his work, proofs may be taken before the subject is completed; in



which case, before commencing to print, the stone is re-covered with the coloured gum, and treated as for a fresh subject.

Some difficulty will be experienced in making alterations on an engraved stone, which necessitates much care and tact in the execution. For trifling corrections, acid applied to the part with a brush to remove the old work, and afterwards passed over with gum, will answer very well; but when the corrections are of a more extensive character, pumice-stone should be used for removal, and a solution of acid afterwards passed over. The alteration is then to be made, having previously applied the coloured gum solution, and allowed it to dry.



## PRINTING—ENGRAVING ON STONE.

THIS process is performed in a similar manner as that laid down for printing transfer and ink work ; but the stone is made damper, a softer roller should be used, charged with printing ink about half the consistency of that used for ink work.

If the subject does not appear clear and sharp, but faint and broken, a dabber, made of a coil of flannel, similar to a copper-plate engraver's rubber, should be applied, the ink still more reduced with thin varnish and oil, and the superfluity removed by passing the printing roller over it.

The ink, if used too thin, is apt to adhere to the surface of the stone, more especially in warm weather, and will print to the detriment of the impression. This is easily remedied by adding a small quantity of gum to the water with which the stone is damped; if that fail, a second roller, with stiffer ink, should be passed over the stone after it has been charged, this usually removes the evil.

A soft and damp paper is best adapted to print from an engraved stone, yet it is not absolutely necessary, as many beautiful impressions are obtained on hard surfaces, such as enamelled cards, but a greater pressure is requisite.

It is advisable to back the stones when used for hard surface printing.

## RE-TRANSFERRING

Or taking duplicates of any subject from stone, copper-plates, or type. It is one of the principal advantages which Lithography possesses, and renders it as indispensable to the letter-press and copper-plate printer as to the lithographer, for by this process the expense and delay of stereotyping can be overcome, while innumerable duplicates may be taken from a copper-plate, and printed at one operation.

With an ink specially prepared, transfers can be kept for very long periods. We have transferred and printed from a subject that has been retained on the transfer paper for two years, and believe it is practicable to keep them a much longer time.

The method of proceeding is thus:—

Well scrape the printing roller, to remove as much of the printing ink as possible. (The use of a roller solely for this purpose is to be recommended.) Place on it a small quantity of the re-transfer ink, and distribute well.

The subject intended to be transferred is to be freed from printing ink, which is accomplished by being pulled through three or four times on as many sheets of clean paper without charging with ink. The stone is then to be damped and charged with the re-transfer ink, allowed to

dry, and the impression pulled on the India re-transfer paper. If the ink is good it is an error to suppose that a large amount or a *dark* impression is required; the best results are obtained from a transfer that appears of a pale colour, as long as the work is *solid* and possesses sufficient grease.

The transfers, if preserved from air and dust, may be kept for several months without any detriment.

The writing transfer paper may be substituted for India re-transfer paper, but in our opinion does not give so clear a proof.

## TRANSFERRING FROM COPPER OR STEEL PLATES.

IF any old copper-plate ink remain in the plate it must be thoroughly removed. This is best effected by heating and covering it with spirits of tar, which is invariably successful.

The plate is to be heated sufficiently to melt the re-transfer ink, which is well rubbed in until it begins to set. Carefully remove the surplus by wiping *across* the work so as not to drag the ink out of it, and well polish with *only a limited* quantity of whiting. Pull the impression on a piece of *slightly* damped India re-transfer paper on the side that has the composition.

A copper-plate press is ordinarily employed for this purpose, but some workmen prefer the lithographic press. The latter does not take so heavy an impression, and renders the liability of smashing, while transferring to the stone, less likely.

There are several sorts of paper used for this process, which work well in the hands of those accustomed to their use. Each kind requires different treatment. We prefer the India paper; it being softer, receives and transfers the impression certainly as well, and, in our opinion, better than all others.

An inferior India paper is imported, which is highly prejudicial to good results, and can be detected by tasting. If there is a presence of acid, it should be rejected, or only used for common work by neutralising by alkali. The best method is to sponge it over before covering with composition with a solution of carbonate of soda. Saturate one sheet in every quire, allow it to soak a short time, and then hang up to dry.

## TRANSFERS FROM CHALK DRAWINGS.

THIS is a more delicate operation than either of the foregoing processes, and although daily performed with success by experienced workmen, it should, where possible, be avoided, as under any circumstances the transfers are inferior to the originals, and are only recommended where long numbers are required to be printed.

The subject must be freed from printing ink in the same manner, and proceed as for ink re-transfers, using the re-transfer ink thicker, and *only the best description of India paper*.



## TO TRANSFER RE-TRANSFERS.

WHERE transfers are pulled upon the writing transfer paper, proceed in the same way as instructed for transferring writing. Where Scotch or India paper is employed for *ink* transfers from stone, or copper-plate, a polished stone, well aired and dusted, must be fitted into the press, and the pressure adjusted. The transfer papers, upon which the subject has been pulled for re-transferring, must be laid between damp paper until the composition has absorbed sufficient moisture to enable it to adhere firmly to the stone, which soon takes place, as the India paper being soft readily receives moisture. If it be too damp, it affects the ink and curdles the work. If too much moisture has been absorbed (which, after a little experience, can be readily determined) it must be allowed to evaporate. Lay it in position on the stone, and after the pressure has been regulated pass the stone through the press under a good pressure two or three times, cautiously damp with the sponge, and again pass through a few more times; after which, saturate with water from the sponge and allow it to soak for a few minutes, gently rubbing with the hand. If, on lifting one of the corners, the transfer ink does not appear firmly on the stone,

remove the surplus water, and place a piece of plate or blotting paper on it, and again pass through the press; wet again, remove the transfer paper, and allow the stone to dry. If any imperfections are visible, now is the best time to have them repaired. Before doing so, remove the stone to the trough, sluice it well with clean water, and avoid rubbing the surface; then allow it to dry. Slightly warm it and have the necessary repairs made good, either with the pen or brush and extra strong writing ink. In the event of any close work (which more frequently occurs in copper-plates) such as machine ruling or vignettes, diluted acid may be advantageously applied after the transfer is (technically termed) made, and before the application of the roller, but it must be used with great caution; gum and acid mixed is a safer method.

The stone must be well gummed, and, where time can be spared, allowed to dry before printing from it, after which, pass the printing roller, charged with ink, over it, and etch with acid (the strength of which must be governed by the nature of the work); gum again, and it is then ready for printing.

If in the course of printing, the subject transferred shows a tendency to thicken, rub it with a piece of flannel saturated with gum water, and use the ink thicker, but in a smaller quantity.

TRANSFERRING DRAWINGS.—This is performed as above, substituting for a polished, a *fine grained* stone. The fine

tints very frequently disappear and are lost by this process, which can be partially replaced thus:—After the transfer is made, remove all the composition from the stone by sluicing it with clean water, allow it to dry, slightly warm it, and then draw in the parts required. The transfer must be etched as for a newly drawn subject.

## DRAWING IN CHALK ON THE STONE.

THIS branch requires more care and attention than any other. The apparent ease with which subjects are drawn on the stone very often deceive the novice, and causes him to treat lightly the importance of observing the necessary precautions which, if not carefully attended to, will render useless what may have occupied weeks in completing.

Before commencing, the artist should be convinced of the quality of the stone and the grain, in accordance with the nature of the subject intended to be produced, the crayon or chalk sufficiently strong to resist the action of the acid, and every precaution taken to be free from dirt and dust, the slightest particle of which, falling on the surface; or the fingers or saliva coming in contact with the stone, will cause imperfections in the drawing which, at the time appear of little import, but are very difficult, and in many cases impossible to remedy.

While pointing the crayon, pieces are apt to fall upon the stone, which should be immediately removed with a flat camels' hair brush, or they will produce a multiplicity of black spots. To obviate these little accidents, the artist must take the precaution of covering the stone with

a sheet of paper, each time his labour is suspended, although it be but temporarily.

A flat grain is more easy to draw upon, but prints heavily and scantily, and is deprived of good effect. On the other hand, if a grain be too coarse, it is impossible to produce detail, because the fine lines or tints are lost in the interstices of the grain, and, in printing, absence of fine tints, and a woolly appearance result. A medium but sharp grain is preferable. Although it gives the artist a little more trouble in working up his subject, the results obtained in printing more than compensate for the extra labour.

The nature and colour of the stone best adapted for this work has been already treated upon under the head of "Stones." We would, however, again remark that too much attention cannot be paid to their selection, in remembering the grey stones more effectually resist the action of acid, and are, therefore, to be preferred to the cream coloured ones. The shade will aid the artist in the general effect of the drawing.

A stone sufficiently large to admit of a few inches margin is desirable, and renders the printing more easy.

Supposing the above precautions to have been observed, the stone should be slightly warmed, to free it from all moisture, and well dusted with a piece of clean fabric, and afterwards with a flat camels' hair brush.

The stone should be placed on a horizontal desk,

with the bridge arranged, and the outline of the subject traced upon it, as described for ink drawings, which is also reversed.

For the convenience of the artist unaccustomed to draw backwards, the sketch or copy, if turned upside down, and a looking-glass placed at its foot, will reflect the subject in the same position as it is to be drawn upon the stone.

The outlines, such as are required for mechanical or architectural subjects are drawn lightly with a fine pointed crayon; for density of colour, such as is usual for the foreground of landscapes or the garment of figures, a soft one may be advantageously employed. Experience is the best guide and instructor.

Crayons are made of three descriptions:—Copal, the hardest, No. 2, medium, and 3, which last is the softest, possesses more grease, produces brighter effects, and adheres to the stone with more certainty, and is, therefore, less liable to suffer from the action of the acid.

The copal, being hard, is more pleasant to use, but in the hands of the inexperienced lithographer it is apt to deceive, by producing effects which, in the process of etching and printing, do not remain. The different grades of durability may be used advantageously in one subject.

For working up even or delicate tints a fine pointed crayon should be used; when bold and bright effects are required, one with a thicker point best answers the purpose.

It is impossible, or nearly so, to produce the effect



required, at once. The first tint should be drawn fainter than is required, and is produced by horizontal lines which must be gone over with other series until the required effect is attained.

Where decided and striking lights are required, an eraser may be used, and should be kept sharp for that purpose.

It is of the greatest importance, that no water be applied to a chalk drawing before it is prepared, as soap employed in the manufacture of the chalk, if dissolved, fills up the grain and produces the same effect as diluted ink ; if such occurs, the only hope is to absorb the moisture by covering it with blotting paper.

## CHROMO-LITHOGRAPHY.

IN practising this branch of Lithography, a knowledge of the theory and harmonious blending of colours is indispensable, but this subject we refrain from entering upon for several reasons. First: a separate volume would be required devoted to that alone, to do it justice. Secondly: every artist is supposed to know all, and even more than we could teach him in so small a space, and has also his own method of regulating the effect of his subject; moreover, perfection, in this particular branch, can only be gained by experience. Equally necessary to perfection is the careful manipulation of the process, which comes within our province to describe.

The principle of printing in colours is the same as for printing in black, substituting coloured inks. Each colour requires a separate stone, and of course entails an additional printing; (except, however, as one water-colour being placed over another, produces a different colour; for instance, yellow over blue, produces green; yellow over red, orange; blue over red, shades of purple, and so on, if strictly observed and practised, will greatly reduce the number of printings, and is, therefore, much more

economical); and a finished effect is obtained by the whole being amalgamated by superposition.

In order to effect this, and to succeed in making a good coloured lithograph, the principal operations to be attended to are: First, the *perfect register*; second, *making the tints*; third, *mixing the colours*.

*First*: the register, or making one colour fit into the other, is one of the most essential points to be observed, and is attained in the following manner:—A line or dot for each colour should be drawn upon the key-stone in such a position as will print upon the extreme margin of the paper. A rather heavy impression, or set off, is pulled from, and transferred on to each one intended to receive the tints; before proceeding further, the dots should be sought after and a small hole drilled on the required one. The subject thus transferred enables the artist to see the requisite place to add his colour. If the subject to be printed in colours is an original production—not a copy—the impression pulled from the key-stone should be coloured in water-colours until the desired effect is produced; by doing this it will greatly assist.

Great inconvenience frequently arises from the stretching of the paper on which the set-off is pulled, more particularly when there are several colours; to obviate this it is desirable to select a thick paper well-cylindrical, or a sheet of the paper the subject is intended to be printed upon, which should be of stout substance—the

first method is advised—and when the press will admit of it, the stone should be printed the short way, to reduce the length of the pull and thus render the paper less liable to stretch.

The ink transferred to the stone in the process of the set-off, unless previously prepared, will print too strongly on the subject; to remedy this, a little sugar mixed with the ink is sometimes used; dusting the impression with lampblack before transferring to the stone is also practised. These precautions are not necessary when solid or half-tints, such as are added to views and chalk drawings, are required, the action of the acid in the process of etching effectually removing it.

Where proper ink is used for making up the colour stones, it is strong enough to resist the action of tolerably strong acid before being rolled up, which effectually removes the set-off; but, of course, judgment must regulate its use.

*Second: Making the tints.*

Where a flat tint only, such as is given by the use of India paper, is required, a grained stone is most suitable and is thus treated:—The necessary margin must be determined upon, and covered with a solution of gum and acid, caution being observed that the liquid does not encroach upon any other part of the stone but where intended, or it will show in the printing. When thoroughly dry, the roller charged with re-transfer ink

should be passed over it until perfectly even; it is then ready. Copal varnish may be substituted for the re-transfer ink, but must be allowed to dry thoroughly before rolling the tint up.

Where lights and fine tints, to produce gradation of tone, are required, the process is varied. A well grained stone is selected, and a set-off pulled upon it; it is then well warmed and the margin and all positive lights gummed out with the solution of gum and acid, and allowed to become perfectly dry, which is facilitated by placing it before the fire until the stone reaches a moderate temperature; those parts that are to have a full tint are then scratched round with a point so that they may be visible; the tinting ink is next to be briskly rubbed into the stone with a piece of woollen cloth until the interstices of the grain appear filled up and present an even surface. The high lights that have been made with the gum and acid are now visible and may be modulated with a knife or scraper, and those parts intended for a solid tint may be seen by the scratched line, and should be covered with a solution of lithographic writing ink dissolved in turpentine, which should be used quickly, as the spirit soon evaporates.

Where quarter, or finer tints, are to form a portion of the picture, a less proportionate quantity of the tinting ink should be applied, but must be rubbed with the woollen cloth until perfectly even; the scraper will be of great use in this process.



Such tints as are required for tinting faces of portraits are more easily and effectually drawn in with the crayon.

The tinting being completed is now to be subjected to the process of etching, which is conducted in the same manner as the method described for chalk drawing, only with a stronger solution, the strength of which must be controlled by the nature of the subject and can only be determined by experience, but it may be remarked that it is better to over-etch a colour stone than not sufficiently.

We append a subject printed in five colours, shewing some of the different effects that can be produced, which we trust may materially aid the artist, feeling assured that an illustration will be of more service than volumes of descriptive matter.

*Third: Mixing the colours.*

The selection of colours is also an important point for consideration. The best are the cheapest and produce corresponding results. Bright colours can always be modified and reduced, but dull ones can never be made bright.

The colours lose much of their brilliancy and virtue by being kept ready mixed, which renders it desirable to mix them when required for use. Too much attention cannot be paid to their being finely ground. Middle varnish is best adapted for this, and should be reduced to the required consistency with thin, both of which should be as colourless as possible in order to prevent any injury to the colour.

*Fourth: Dusting.*



When sufficient density and brightness cannot be obtained by body colours, recourse must be had to dusting, which is performed thus:—The impression is pulled with an ink, which acts as a medium for the adherence of the colour. The dusting colour, being passed over with a piece of cotton wool, should adhere to those parts only where the composition is, but, unless care be taken, it will also adhere to the other portions of the paper (except it is enamel paper) and it is very difficult to remove; this occurs more frequently with dusting blue (ultramarine) which, however, may be avoided by adding to the colour a small quantity of salt, sprinkle with water, well mix, and dust while slightly damp. In all cases where dusting is resorted to, the paper should be well glazed, as the colour is liable to adhere to the entire surface, if not well rolled.

**TO PRINT FLOCK.**—As large a body of ink as possible should be used. The flock is applied by sifting on to the impression, and is then pulled through the press on the top of the succeeding one, and laid on edge until perfectly dry.

For dusting blue or green, the ink should be mixed with strong varnish and prepared white.

For gold or silver bronze, burnt umber with stiff varnish.

For metal bronze, extra strong varnish.

For flock, extra strong varnish and a small quantity of gold size.

## MAKING UP COLOURED LABEL STONES BY TRANSFERS.

WHERE there are a large number of one subject, such as labels, to be printed, it is advisable to place several upon the stone, and where the detail is minute the expense and the time consumed in making up a sheet of colour stones is considerable. These difficulties may be entirely overcome by making the colour stones up by transfers, which is performed as follows:—If the subject be a label of four colours, and gold to be the key-stone, one label is drawn, from which the set-offs are taken, and the colours made up on the same stone, which should be proved, to test their register. The required number of transfers are then pulled from the gold (key-stone) and laid down for the sheet; three impressions must be pulled in black ink on the paper to be employed in printing. The same number of transfer as labels on the sheet are then pulled from each of the other three colours on transfer paper, which is specially manufactured for this purpose. The transparency of the transfers enables their exact position to be seen when placed over the impression pulled from the sheet already made up, to which they should be stuck with a very minute quantity of mouth-glue until the whole are completed, when it should be immediately transferred

to another stone. The succeeding colours are to be served in the same way, each requiring the same treatment.

The sheets thus made up are transferred differently to ordinary transfers. The method of proceeding is performed as follows:—

A prepared stone is slightly warmed, and the sheet of transfers is then laid upon it and pulled through the press once, when it should be examined to see if the transfer paper sticks closely to the stone, if so, and the work to be transferred is very fine the process may be repeated, but one pulling through with a good pressure is to be preferred, as any shifting of the paper will cause the transfer to double and the work to be rendered useless.

## PRINTING COLOUR STONES.

THE same instructions are to be observed as laid down for black work, grained stones requiring the same treatment as drawings, and polished ones as ink. Care should be taken to prevent the possibility of the colour being in the slightest degree dirty, which can only be obviated by observing the greatest cleanliness in every portion of the process. On receiving from the artist a properly etched stone intended to be printed in colour, the gum must be dissolved and removed, and the subject washed out with turpentine, and rolled up in black ink, as any defects are more readily seen and more effectually remedied. It should then be allowed to remain under gum for a few hours. In the meanwhile the colours can be ground and mixed to the desired shade.

A grained roller is best adapted for tints and the average description of colour work; but, as has been before mentioned, a separate one must be used only for one class of colour, as it cannot be easily removed; but for ink work, such as for labels, a smooth one will answer every purpose.

In printing tints, the finer and half tints are apt to be filled up with the colour, and become solid; this is controlled entirely by the roller, the use of which can only be attained by practice. When such or any other difficulty

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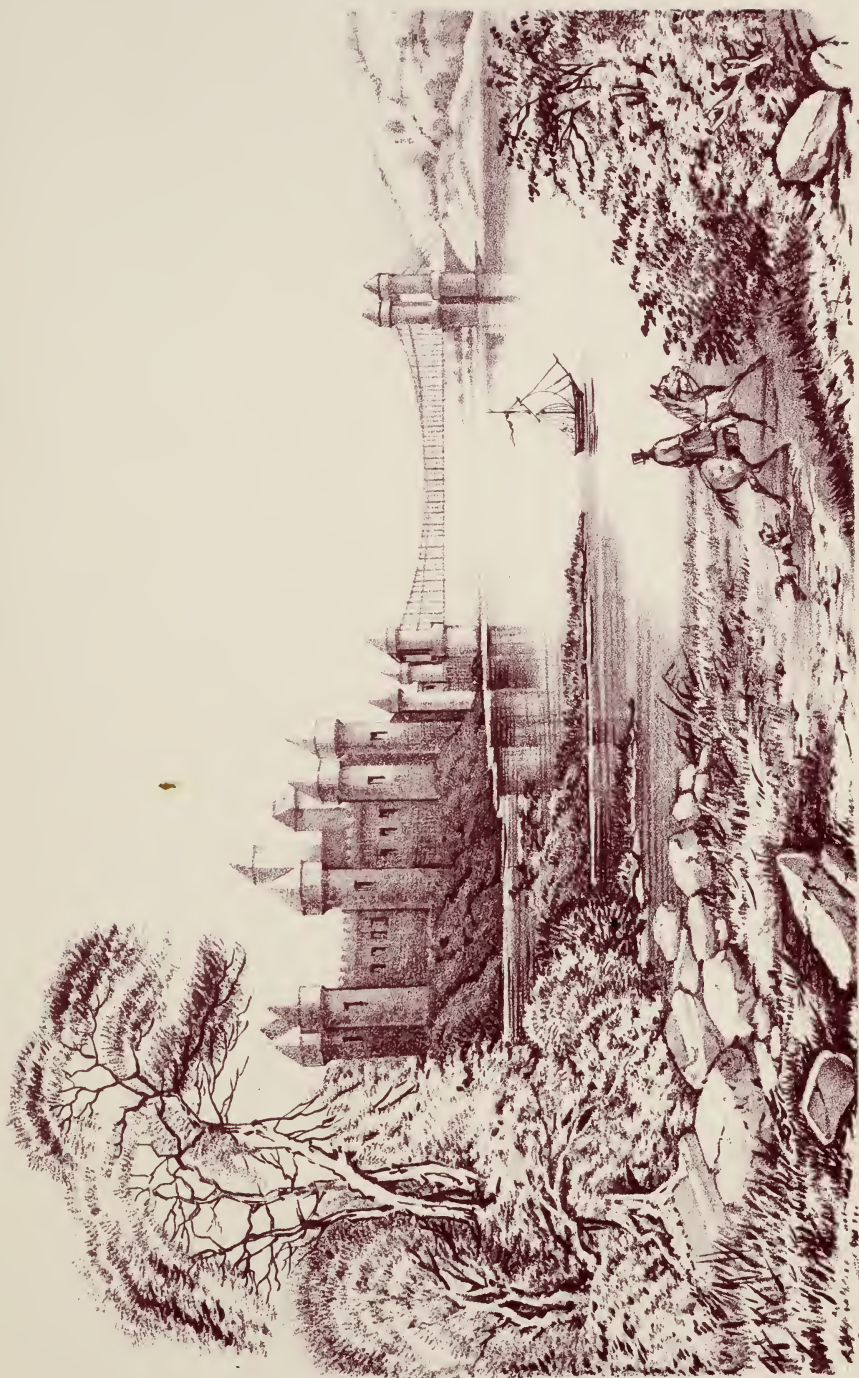






















occurs, the stone must be rolled up with black ink before attempting a remedy, and if it still appears clogged up should be rolled briskly with a hard roller with a little stiff ink upon it, or it can be rubbed with a piece of flannel moistened with gum, as instructed for the treatment of writings. Where erasures have to be effected they should be done with a stump and acid, and the use of the scraper or knife entirely discarded, the coloured ink being much more susceptible of adhering to those parts of the stone than black.

When a colour stone is intended for future use it should on no account be allowed to remain with the coloured ink upon it, but must be rolled up with stiff black ink, observing that the half tints are perfectly clear and distinct, and covered with a thin solution of gum, applied with a sponge.

## GRADUATED TINTS.

By this process tints are obtained of different colours and shades by one printing only; which add greatly to the appearance of views, where the sky is required blue and the foreground a warm colour.

The stone should be washed out, and the slab and roller perfectly cleaned, the intended colours well ground and mixed to the necessary consistency, and applied to the roller, (which should be the same size as the subject), thus—blue at one extremity, pink in the centre, and a warm tint at the other extremity; the ink thus applied must be distributed by keeping the roller perfectly straight, and passing it backwards and forwards on the slab, with an occasional slight angle, to graduate the colours; the subject is charged with the ink, by one movement of the roller. The number of colours can be increased according to the nature of the subject and the effect desired. A separate palette knife should be used for each colour.

## BRONZE PRINTING.

As before mentioned, dusting colours should always have the precedence in printing, more particularly bronze; it being finer, it is more susceptible of adhering to any ink previously printed.

Bronzes are made of several shades and colours, and vary considerably in quality. The finer kinds are to be recommended for ordinary work and are more desirable as a much smaller quantity attaches itself to the composition and produces a clearer and sharper result. Where the work is heavy and common the coarser qualities may be substituted, the composition, being in a greater body, causes it more readily to adhere.

Printing in bronze is conducted in the same manner as already laid down for dusting colours, substituting a composition specially prepared, which is applied in a small quantity to the roller, and well distributed.

The subject should be rolled briskly, as the composition is apt to fill in the work, and the sheet dusted over with the bronze immediately after it is pulled from the stone, with a piece of cotton wool; this is usually performed by a boy.

Bronze being a very expensive material, renders caution desirable in its use, for if left to the discretion of the lads

—and we regret to say in many cases also to the men—a much larger quantity is wasted than consumed, the best means of avoiding which is to place the boy who is to dust the sheet in such a position as to be entirely free from draughts, which is frequently occasioned by the speedy movement of the tympan frame. A shallow box lined with enamel paper is very useful to dust the sheet in, and will in a great measure prevent the bronze flying about.

When the work is finished, the sheets printed and bronzed should be allowed to remain for about six hours, and then be finally dusted on both sides with wool or a piece of fine canvass or linen.

Rubbing the bronze firmly when applying it to the sheet tends to increase its brightness.

## LEAF METAL PRINTING.

WHERE sufficient brightness cannot be obtained by the use of bronze, recourse must be had to sheets of Dutch metal, which produces much brighter effects, although its application is attended with more inconvenience, and less expedition, thus causing it to be more costly.

This process is conducted very similar to bronze. The composition is used much stronger and stiffer, and is applied sparingly to the roller. When the impression is pulled it must be placed on a flat surface, and the leaf metal laid entirely over it, which is fixed to the composition by placing a sheet of glazed paper over it and pressing with the hand. Two sheets thus covered and pressed are placed face to face, laid on the top of the following impression, and pulled through the press; by this means the one imparts to the other any deficiency which may exist by being imperfectly covered. They should then be lightly rubbed with a few sheets of the empty books from which the metal has been taken. The entire removal is next effected with a piece of cloth or flannel, but not until the composition is perfectly dry, which generally takes in about two days.

The application of the metal is difficult to those unaccustomed to it. Boys are employed expressly for this,

and good hands will consume a much less quantity than those inexperienced.

Cylindering or rolling greatly improves the appearance of bronzed and metal work, but if other colours are to be added, this operation must not be performed until all are printed.



## ZINCOGRAPHY

IN principle is the same as Lithography, a zinc plate taking the place of a stone. We cannot recommend its use to the inexperienced Lithographer, although, in the hands of the skilful operator, results are attained equal in every respect to those from stone; therefore, some advocate its use; but the stone is more generally preferred. Zinc is best adapted for large subjects, such as maps, plans, and ink drawings; it is more portable, not liable to break, and being less costly than stone, is greatly in its favour. The following is the method of proceeding:—

Take a plate rather larger than the subject, which must be perfectly even and planished, polish it well with pumice-stone and clean water until all scratches are effaced, and grain with fine sand, as instructed for preparing the stone for chalk drawings, adopting the use of a small piece of zinc, the edges of which must be bent round a block or large cork, so as not to let them come in contact and scratch the surface of the plate. This preparation is necessary for all descriptions of work whether chalk, ink, or transfer.

The zinc plate (being easily injured), must not be allowed to remain in a wet or damp state longer

than is absolutely necessary, but be dried by artificial heat. *This, however, must be strictly observed in every part of the process, whether completed or only temporarily laid aside.*

The subject is transferred to the plate in the same manner as that described under the various heads mentioned for stone, adopting the same precautions, and treating in the same way until the subject is on the plate; when a solution of gum must be passed over it, and afterwards a solution of nutgalls, which must be allowed to remain on for about seven minutes, and then washed off with water. The work must next be washed out with turpentine, and rolled up with the printing roller; it is then ready for printing, which is done in the same manner as from stone. The operation of what is technically termed "washing out," apparently destroys the subject; but this is not the case—it only removes the printing ink from it.

We have observed that by washing out a subject recently transferred to the plate it is difficult to roll up, and in many cases, it presents a feeble and weak appearance, which has induced us to vary the process, and, in our opinion, with considerable success.

Instead of placing the preparation of nutgalls over the plate before rolling up, we have gummed it in, applied the printing roller, and proceeded as for a stone, applying the solution of nutgalls afterwards: by this means the work need not be washed out at all, and thus is as strong as when first imparted.

The use of acid in this process is to be most carefully avoided. The preparation of nutgalls being its substitute; should any soils present themselves, they can be removed with pumice-stone.

To erase a subject from the zinc plate—preparatory to another taking its place—is best effected by pumicing and re-graining; but, where expedition is necessary, it may be obviated by removing the ink with turpentine, and passing over it a weak solution of potash, which must afterwards be thoroughly removed by repeated washings in clean water. When dry it is fit for use.

Copper-plates will produce the same results, and can be treated in the same manner, but, being more expensive, they are rarely used.



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20	„ 30	12	10 0	32	„ 49	32	0 0
22	„ 33	13	15 0	34	„ 51	34	0 0
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2 Handles.

With Wheel and Pinion.

STEAM LITHOGRAPHIC PRESSES, which run the Bed through the Press and return it to its original position by a mechanical arrangement (patented). Not liable to get out of order. Price on application.

N.B.—The patented apparatus for running the Bed through the Press, etc., can be applied to the Presses made by most manufacturers.

## TYMPANS.

Tympan Leather, English.....	per square foot	s. d.
„ „ French.....	„	3 6
„ Zinc.....	„	4 0
„ Brass.....	„	0 9
Boxwood Scrapers.....	to ½-in. thick, per square inch	1 6
Elastic Bedding for Lithographic Stones.....	per square foot	0 0½
		0 9

## ROLLERS.

11 × 12 in. English.....	each	s. d.	Roller Skins, French.....	each 8s. 6d. &	s. d.
„ „ French.....	„	9 6	„ „ English.....	each	9 6
12 × 12 in. „.....	„	12 0	Rollers in working order.....	„	7 6
		13 0	Roller Handles.....	per pair	1 0

## GERMAN LITHOGRAPHIC STONES.

1d. per lb.	1¼d. per lb.	1½d. per lb.	1¾d. per lb.	1½d. per lb.	2d. per lb.	2½d. per lb.	3d. per lb.	4d. per lb.
10 × 8	14 × 10	17 × 11	21 × 15	26 × 18	32 × 24	36 × 30	42 × 32	48 × 32
11 „ 9	14 „ 11	17 „ 13	21 „ 16	26 „ 20	34 „ 24	38 „ 24	44 „ 32	49 „ 31
12 „ 9	15 „ 10	18 „ 12	22 „ 14	27 „ 21	34 „ 25	38 „ 26	46 „ 30	50 „ 30
12 „ 10	15 „ 11	18 „ 14	22 „ 15	28 „ 20	36 „ 24	38 „ 28	46 „ 32	52 „ 32
13 „ 10	15 „ 12	19 „ 13	22 „ 16	28 „ 22	36 „ 26	40 „ 28	.. ..	54 „ 36
.. ..	16 „ 10	19 „ 15	22 „ 18	30 „ 20	.. ..	40 „ 30	.. ..	.. ..
.. ..	16 „ 12	20 „ 13	23 „ 17	30 „ 22	.. ..	.. ..	.. ..	.. ..
.. ..	.. ..	20 „ 14	23 „ 18	31 „ 21	.. ..	.. ..	.. ..	.. ..
.. ..	.. ..	21 „ 13	24 „ 16	32 „ 22	.. ..	.. ..	.. ..	.. ..
.. ..	.. ..	.. ..	24 „ 18	.. ..	.. ..	.. ..	.. ..	.. ..
.. ..	.. ..	.. ..	25 „ 19	.. ..	.. ..	.. ..	.. ..	.. ..

Snake Stone.....	per lb. 8d.	Snake Stone in thin Slips each, 1¼d. 2d. 3d. 4d.
Pumice Stone.....	„ 5d.	Slates for Backing..per square foot, from 1s. 6d.

N.B.—Not accountable for Breakage under any circumstances.

# BENJAMIN WINSTONE'S PRICE LIST OF LITHOGRAPHIC MATERIALS.

## BRONZE POWDERS.

	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.	Per lb.
Pale Gold .....	7/6	8/-	9/6	10/6	11/6	12/-	14/-	16/-	18/-	20/-	30/-	35/-	40/-	80/-
Yellow .....	..	8/-	9/6	10/6	..	12/-	..	16/-	..	20/-	30/-	..	..	..
Medium .....												..	..	..
Pale Red Gold }	..	8/-	..	..	..	12/-	15/6	16/-	..	20/-	..	35/-	..	..
Copper .....												35/-	..	..
Deep Gold .....	7/6	8/-	9/6	10/6	11/6	12/-	14/-	16/-	18/-	20/-	..	..	..	..
Crimson .....	7/6	8/-	9/6	10/6	..	12/-	14/-	16/-	18/-	20/-	30/-	..	..	..
Citron .....	7/6	..	..	10/6	..	..	14/-	16/-	18/-	20/-	..	..	..	..
Orange .....	7/6	8/-	9/6	10/6	..	12/-	14/-	16/-	18/-	20/-	22/-	..	..	..
Green .....	7/6	..	..	10/6	..	12/-	14/-	16/-	18/-	..	30/-	..	..	..
Purple and Flesh	7/6	..	..	10/6	..	..	11/-	..	18/-	..	30/-	..	..	..
White or Silver	7/6	8/-	9/6	10/6	..	12/-	14/-	16/-	18/-	..	..	..	41/-	..
Composition }													..	..
Brilliant Gold ..	..	..	..	..	..	..	..	..	..	..	..	..	42/-	..
By the ounce ..	..	..	9d.	10d.	..	1/-	..	1/3	1/6	1/3	2/3	2/6	3/-	5/6

## FÜCHE'S GERMAN BRONZES.

Citron .....	per lb. 13s., 15s. 6d., 19s., 21s., 23s., 33s., 38s.
English Green Gold .....	per lb. 23s., 33s.
Orange .....	.. 23s., 33s.
Pale Gold .....	.. 21s., 33s.
Silver Composition (white) .....	.. 21s., 30s.

## DRY COLOURS (PRINTING).

ENGLISH, FRENCH, AND GERMAN.

### BLUES.

	Per lb.—s. d.		Per lb.—s. d.
Chinese, deep .....	3 6	Ultramarine French .....	4 6
Bronze Blue .....	4s. 6d. and 5 0	„ (very fine) .....	10 0
Antwerp .....	5 0	Blue Lakes (Light) No. 1. ....	10 0
Pure Blue .....	4 0	„ (Dark) No. 20. ....	9 6
„ Extra Bright .....	4 6	Steel Blue .....	5 0
Cobalt .....	10s. 6d., 21s. 6d. & 32 0	Indigo .....	10 6
Ultramarine (in original packets), 1 lb.	5 6	Oriental .....	6 6

### CARMINES.

	Per lb.—s.		Per lb.—s.
No. 1, C.S. } per oz. 5s. 6d. { Lump }	.. 80	No. 3, C.S. per oz. 4s. 6d. Lump .....	50
„ 2, C.S. } Powder }	.. 80	„ 4, C.S. „ 2s. 6d. Powder .....	35

### GREENS.

	per lb.—s. d.		per lb.—s. d.
Lakes, No. 1, dark .....	3s. 6d. and 5 0	Lakes, No. 3, pale .....	3s. 6d. and 5 0
„ 2, middle .....	3s. 6d. and 5 0	Oxide of Chromium, for Bank Notes..	9 0

### VERMILION.

MARK.	per lb.—s. d.	MARK.	per lb.—s. d.
Dark or Carmine F.B. ....	5 0	Deep Carmine B.E. ....	6 0
Middle F.B. ....	5 0	Pale B.E. ....	6 0
Pale F.B. ....	5 0	Middle Shade A. ....	5 0

(Ten per cent. less charged for 14lbs. and upwards.)

### WHITE.

	s. d.		s. d.
Dry White Lead .....	per cwt. 48 0	French Drop (Blanc d'Argent) per lb.	2 9
Flake White .....	per lb. 0 8	Kremnitz .....	.. 1 0

# BENJAMIN WINSTONE'S PRICE LIST OF LITHOGRAPHIC MATERIALS.

## LAKES.

### FRENCH, GERMAN, AND ENGLISH.

	per lb.—s. d.		per lb.—s. d.
Blue Lake .....	9s. 6d. and 10 6	000, S. Crimson .....	36 0
No. 7, S. Carmine .....	57 0	000, S. Scarlet .....	38 0
„ 8 do. ....	67 0	Purple .....	21 0
„ 9 B. do. ....	52 0	Brown Lake .....	12 0
„ 10 Carmine .....	45 0	Red Brown Lake .....	8s. 6d. and 10 0
„ 11 .....	30 0	Cherry Lake .....	19s. 0d. and 21 6
„ 11, S.B. do. ....	32 0	Violet, No. 1 .....	7s. 0d. and 10 0
„ 13, S. do. ....	24 6	„ „ 2 .....	14 6
„ 16 do. ....	7 6	„ „ 3 .....	21 6
„ 17 do. ....	14 0	„ „ 4 .....	37 6
„ 95 Scarlet .....	25 0	„ „ 5 .....	60 0
0000, S. do. ....	21 0	„ „ 6 .....	76 0
0000, S. Crimson .....	21 0	Madder Lakes .....	32 0
0000, C. ....	21 0	Rose do. ....	12s. and 21 0
French Lakes .....	70 0	Claret Lake .....	5 0

## YELLOW.

	per lb.—s. d.		per lb.—s. d.
Chrome, Pale. 1s., 1s. 3d., 1s. 8d., and .....	2 0	Naples .....	5 0
„ Middle .....	1 8	Yellow Lake .....	5s. and 10 6
Orange .....	1 8	Indian Yellow .....	32 0
Scarlet .....	1 8	Cadmium .....	27 6
Zinc Yellow .....	4 0	Royal .....	16 6

## SUNDRIES.

The following are finely levigated, free from grit, and easily ground.

	per lb.—s. d.		per lb.—s. d.
Indian Red, 2 Shades .... 1s. 4d. and .....	2 0	Venetian Red .....	1 4
Ochre, Yellow .....	0 7	Vandyke Brown .....	0 8
Ochre, Red .....	0 7	Orange Lead .....	1 0
Sienna, Burnt .....	1 4	York Brown .....	1 4
„ Raw .....	1 4	Rose Pink .....	8d. and 1 0
Umber, Burnt .....	1 4	Dutch Pink .....	1 0
„ Raw .....	1 4	Sepia Color .....	1 4
Bistre .....	0 7		

## DUSTING COLOURS.

	per lb.—s. d.		per lb.—s. d.
Ultramarine .....	from 1s. to 3 6	Mauve .....	3 6
Emerald Green .....	1 6	Magenta .....	3 6

Preparations for Printing above, see Printers' Ink.

## FRENCH DUSTING COLOURS.

	per lb.—s. d.		per lb.—s. d.
Carmine Metis .....	30 0	Rose Bengal .....	5 6
Amaranthe .....	7 6	Rose Indian .....	6 0
Grenat .....	7 6	Green .....	5 6
Tunis .....	7 6		

Other shades in stock.

## Letter-Press, Copper-Plate, and Embossing Inks:

PRICES ON APPLICATION.

## PHOTO-ZINCOGRAPHY.

PRESSES, PRINTING INKS, & MATERIALS:

PRICES ON APPLICATION.

